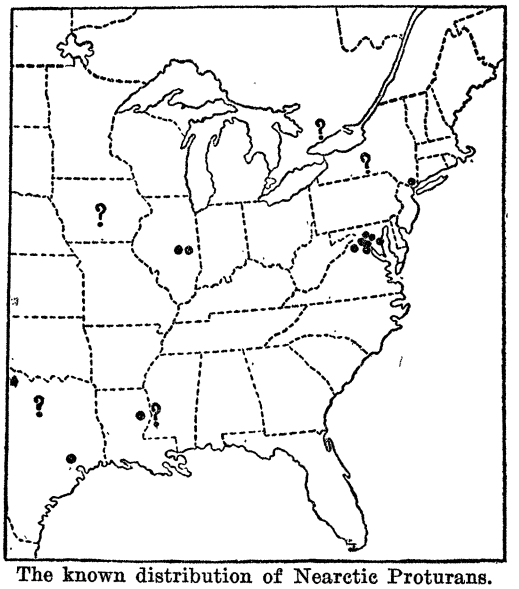
Great Falls, Va.; Tallulah, La.; Houston, Tex.; Chesterville, Ill.; near Decatur, Ill.

Proturans have been searched for but not found in the following localities: Vicksburg, Miss.; Dallas, Tex.; Ames, Ia.; Toronto, Can. In addition, also, Professor Silvestri has looked for them at Ithaca, N. Y., without finding any.

The known distribution up to date of Proturans in the Nearctic is shown by the accompanying figure, each positive record being indicated by a large dot and each negative record by a question mark.

It would be premature at this time to attempt any generalizations in regard to the Nearctic distribution of these most primitive hexapods, yet by way of summary it may be noted that up to the present Proturans have been found in 9 localities in the Upper Austral Life Zone, these records coming from 4 different states; from 2 localities in the Lower Austral Life Zone, the records being from different states; from 1 locality in the Transition Life Zone. Of the negative records, 1 is from the Upper Austral, 2 from the Lower Austral and 2 from the Transition.

The only life zone in which these hexapods have been found in either abundance or diversity is the Upper Austral. In the Lower Austral only two minute under-bark species were taken—two specimens of *Eosentomon pallidum* Ewing from Tallulah, La., and two specimens of *Eosentomon minimum* Ewing from Houston, Tex. In the Transition, three specimens of *Eosentomon wheeleri* Silvestri and one specimen of *Eosentomon pallidum* Ewing were taken from decaying leaves and twigs near Bluemont, Va., at the top of the Blue Ridge Mountains (elevation 1,200 feet).



The known distribution of Nearctic Proturans.

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STEM END ROT OF APPLES

DURING the late spring of 1921 a large number of apples were found which developed a decay at and around the base of the stems. These apples were in a lot that had been removed from a cold storage temperature of 32° and held for a few days at 45° Fahr. When placed in moist chambers such apples very soon decayed without wrinkling, becoming soft and watery. The decay was of a sharply defined nature, such that the affected parts could be easily removed. Normally these decayed apples were soon covered with green mold. On examining the stems of apples in storage it was found that many stems were green with spores. Cultures of this mold were made by the poured plate method. The fungus was believed to be *Penicillium expansum* Link., and was later identified as such by Mr. Charles Thom of the U. S. D. A., Bureau of Chemistry.

A search of the literature on apple decay was made, but no mention of the entrance of a decay-producing organism through the stem was noted. The decay of apples ordinarily caused by *P. expansum* is invariably mentioned in connection with abrasions of the skin, such as insect punctures, wounds or injuries of a mechanical nature. Some writers mentioned the infection as entering through the calyx or blossom end but no one noted stem end infection.

The matter was taken up with Mr. E. A. Siegler, assistant pathologist of the U. S. D. A., Bureau of Plant Industry; Mr. Charles Brooks, pathologist, and Dr. Charles Thom, mycologist, U. S. D. A., Bureau of Chemistry, none of whom had noted such a decay gaining access to the apple by way of the stem. In fact they

doubted the possibility of any fungus traversing the dry stem of an apple. It is well proven that stem end rots occur in other fruits, for example, the stem-end rot of citrus caused by *Phomopsis* sp. and the stem-end rot of both citrus and watermelon caused by two species of *Diplodia*.

In the fall of 1921, large, mature Yellow Bellefleur apples were secured from trees in a Berkeley garden. These apples were picked with the fruit spurs attached, carefully washed in wood alcohol, mercuric chloride solution 1-1000 and distilled water consecutively. The leaves were clipped from the spurs to facilitate the work but the spurs were not removed. Moist chambers were sterilized, lined with filter paper, washed out with mercuric chloride solution, rinsed with distilled water, glass covers were prepared in the same manner. The spurs were then removed from each apple in turn and spores of *P. expansum* from sub-cultures made from the original isolation were planted on the freshly exposed surface at the ends of the apple stems, and the apples placed in the moist chambers. Control apples similarly treated but not inoculated were placed in jars prepared in the same manner and all were kept under the same conditions in the laboratory. Of the six apples treated in this manner, four developed the characteristic stem end rot and were soon completely decayed. The check apples kept in good condition for three months.

Yellow Newtown apples were picked in the same manner at Watsonville, California, and brought to Berkeley. On October 17, 1921, three of the ripest of these apples were treated and inoculated in the same manner as the Bellefleurs. On November 18 the decay of all three apples was identical with the decay observed on the fruits naturally infected. Six Yellow Newtown apples were treated in the same manner and inoculated with the same organism several days later than the previous group and they all developed the typical decay. In all cases the checks remained in good condition. At the end of six weeks, all the apples so inoculated were entirely decayed and covered with green spores.

Cultures of the spores appearing on the surface of the inoculated apples were made and appeared identical in every way with the original culture. Stab inoculations were made with these re-isolated cultures on apples also carefully sterilized. At the same time other apples were inoculated with the original culture. The results were identical, the typical Penicillium decay of apples resulting at every puncture. A penicillium isolated during the fall of 1921 from decaying prunes was found to cause typical decay of apples when inoculated into the flesh. This prune penicillium was planted on three Yellow Newtown apple stems and within three weeks it caused typical stem end decay of all three apples. This organism was later found to be identical in all of its reactions with the original penicillium isolated from apples.

Washings made from the attached leaves on some of the apples used in the experiments were plated and typical colonies of *P. expansum* appeared on all the plates so made. About 15 per cent. of the colonies which grew were identified as some species of Penicillium, a considerable number of which caused typical *P. expansum* decay when inoculated into mature apples. This would indicate the prevalence of the organism in the trees at the time of harvest.

These results prove that stem end infection of apples is a possibility. Observations by the writer indicate that this mode of infection is quite common among the apples of this state, especially in Yellow Newtowns. Though retarded in cold storage, the rot makes some progress at a temperature of 45° Fahr. and at room temperature the decay is rapid.

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THIRTY-FOURTH ANNUAL MEETING

THE thirty-fourth annual meeting of the American Physiological Society was held during the Christmas holidays under the patronage of Yale University, New Haven, Connecticut. Two scientific sessions daily were held December 28, 29 and 30. The meetings opened at 9:30, December 28, with a joint session of the societies of the Federation of American Societies for